

PATENT ABSTRACTS OF JAPAN

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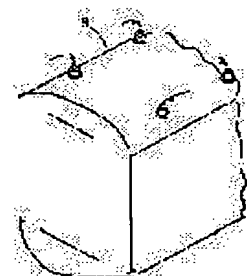
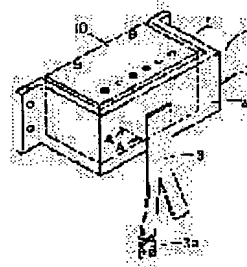
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(54) HEAT INSULATION DEVICE FOR BATTERY PROTECTION

(57)Abstract:

PURPOSE: To reflect and isolate the outside air temperature to a battery, and insulate and radiate the heat to protect the battery by providing a body part formed by laminating a heat insulating resin layer on a metal film, and a heat radiating member mounted on the metal film and lead out from it.

CONSTITUTION: At least one metal film on the walls 4, 5 of a body part 2 is arranged on an engine 9 side of the outer surface, a heat insulating resin layer is laminated adjacent to the metal film, and a heat radiating member 3 is mounted on the metal film of the engine side wall 4. Thus, the high temperature heat of an engine room is reflected by the metal film, insulated by the heat insulating resin layer, and discharged through the member 3. Since heat insulating, heat reflecting, and heat radiating effects are thus enhanced, and battery is difficult to receive the influence of the engine heat, liquid temperature rise is minimized, and ordinary temperature can be comparatively held. Therefore, the battery the evaporation of sealing liquid of the battery (exhaustion of liquid) is minimized to make the battery free from maintenance, the thermal shock in the battery is minimized to improved durability, and heat retaining property can be enhanced as the battery is protected by the heat insulating material.



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CLAIMS

[Claim(s)]

[Claim 1] Thermal-insulation equipment for dc-battery protection which carries out the laminating of at least one metal membrane outside, and is characterized by to equip this metal membrane with the body section which carried out the laminating of the heat insulation resin layer, and was formed, and the radiator material which attached in the metal membrane and was drawn in the thermal insulation equipment for dc-battery protection with which it comes to carry out the laminating of the resin and the metal membrane for arranging in the external surface of a dc-battery case.

[Claim 2] Thermal insulation equipment for dc-battery protection according to claim 1 characterized by preparing the attachment section which forms the above-mentioned body section in box-like from a side attachment wall and a bottom, and is connected to the end side of radiator material at the low-temperature section of a car body.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] About the thermal insulation equipment which protects the dc-battery of an automobile from the environmental temperature in an engine room, especially, this invention uses reflection, thermal insulation, and thermal conduction cooling, and relates to the thermal insulation equipment for dc-battery protection which prevents overheating of a dc-battery.

[0002]

[Description of the Prior Art] In recent years, engine piston outer wall temperature is high with 250 to 300 degrees C with the high increase in power of the engine for automobiles, turbo-izing, and small and lightweight-izing. [conventional] And with high **** in an engine room, and the formation of a small tooth space, the space in an engine room becomes narrow and the environmental temperature in an engine room also has the inclination of elevated-temperature-izing by leaps and bounds. A dc-battery is also put on the bottom of a hot environment under such conditions, and it has become the cause of faults, such as evaporation of dc-battery liquid, and a life fall. Although the dc-battery was conventionally loaded as it was in the automobile engine room, the approach of holding and insulating in the case which covers a dc-battery by heat insulation members, such as resin and heat insulation form, or the member of a laminated structure, or consists of these members (referring to the official report for JP,63-82454,A, JP,3-92377,U, etc.), or insulating by installing a dc-battery out of an engine room etc. is performed so that the above-mentioned fault may be prevented.

[0003]

[Problem(s) to be Solved by the Invention] However, although dc-battery liquid will go up at 70 degrees C in 3 - 4 hours if a dc-battery is loaded as it is in a 80-degree C automobile engine room, with the thermal insulation equipment of the above-mentioned conventional dc-battery using heat insulation form etc., the time amount which goes up dc-battery solution temperature at 50-60 degrees C is delayable in 3 - 4 hours. However, although the time amount to which dc-battery solution temperature rises was delayable with conventional thermal insulation equipment, heat dissipation cooling was not able to be carried out from the environmental temperature of an engine room.

[0004] As this invention was made in view of the problem which the above-mentioned Prior art has, and it radiates heat while it intercepts the OAT to a dc-battery by reflection and heat insulation, it aims at offering the thermal insulation equipment for dc-battery protection which protects a dc-battery.

[0005]

[Means for Solving the Problem] In the thermal insulation equipment for dc-battery protection with which it comes to carry out the laminating of the resin and the metal membrane for arranging in the external surface of a dc-battery case, this invention carries out the laminating of at least one metal membrane outside, and is characterized by equipping this metal membrane with the body section which carried out the laminating of the heat insulation resin layer, and was formed, and the radiator material attached and drawn at the metal membrane. In addition, the above-mentioned body section is formed in box-like from a side attachment wall and a bottom, and if the attachment section linked to the low-temperature section of a car body is prepared and this is connected to the end side of radiator material, conduction heat dissipation will become good further.

[0006]

[Function] According to the thermal insulation equipment for dc-battery protection concerning this invention, as mentioned above The body section which has arranged at least one metal membrane to the external surface side, carried out the laminating of the heat insulation resin layer to the external surface of a dc-battery case, and formed it in it at this metal membrane, Since it constitutes from radiator material which the metal membrane was made to extend and was attached and this thermal insulation equipment is arranged in the external surface of a dc-battery case, the hot heat of an engine room is reflected by the metal membrane, and it insulates with a heat insulation resin layer, and emits via radiator material. Thus, a dc-battery is intercepted from the elevated temperature of an engine room by reflection and heat insulation, by heat dissipation, temperature can be lowered and dc-battery solution temperature can be maintained below to the environmental temperature of an engine room. Moreover, for the surface of metal of thermal insulation equipment, inflammability-proof and fire retardancy can improve and safety can be raised. If the configuration of the body section of the thermal insulation equipment of this invention is the type which covers the side face which the bottom opened, it can be easily attached in an existing dc-battery, and since the outcrop of a dc-battery will be made few if it is box-like [with a bottom] from a side attachment wall and a bottom, the effectiveness of thermal insulation becomes good so much. Even if it is the case where it leaves for a long time, since the member of a car body and the temperature gradient of an engine room are small, they can prevent cooling like conventional thermal insulation equipment, without moving an engine.

[0007]

[Example] Hereafter, the example of this invention is explained based on a drawing. Drawing 1 thru/ or drawing 4 are drawings showing the 1st example of this invention. In these drawings, 1 is thermal insulation equipment of this example, is equipped with the

body section 2 and the radiator material 3, is constituted. The body section 2 consists of wall 4 and the side-face wall 5 by the side of an engine 9, and it is made to have the side face of the methods of three of a dc-battery 10 enclosed. As shown in drawing 2, at least one metal membrane (metal film) 6 of the walls 4 and 5 of the body section 2 is arranged to the outside engine 9 side, a metal membrane 6 is adjoined, and the laminating of the heat insulation resin layer 7 is carried out. The radiator material 3 is attached in the metal membrane 6 of the wall 4 by the side of an engine.

[0008] Although the side-face wall 5 of the above-mentioned body section 2 is formed in the both sides of a wall 4, what you may make it enclose all the side faces of a dc-battery 10, and enclosed only the side face of the method of two may be used. It really fabricates or pastes up, and this body section 2 is formed by a laminating etc., and is arranged by attaching in it by pasting a dc-battery 10 or using auxiliary metallic ornaments, an attachment member, etc. on the external surface of a dc-battery 10, or attaching in dc-battery fixing metal etc. Although the film formed by films, such as stainless steel, aluminum, and copper, the plate, plating, or vacuum evaporation is mentioned as an example of a metal membrane 6, the thickness influences the weight and the conduction heating value of equipment, and especially limitation is not carried out, it is good at 50–200 micrometers. Since a thermal reflex will be improved if glossiness is high, it is effective. Moreover, if an ingredient with high thermal conductivity is used, heat conduction to the radiator material 3 will become good so much, and heat dissipation will become good. Foaming resin, such as resin, such as polypropylene, polyester, and an acrylic, or urethane foam, and polyethylene foam, is used for the heat insulation resin layer 7 which carries out a laminating to a metal membrane 6. Lightweight-ization is attained and this thickness is set to 5mm – 30mm, and expansion ratio is made into five to 30 times, and it is made not to make it not much thick by using foaming resin. Moreover, the combination of resin, the combination of a heat insulator and resin, and fiber etc. may be formed from two or more layers.

[0009] When the sheet of a metal and heat dissipation nature rubber etc. is used as a member with a flexible thin film as radiator material 3, it excels in the attachment nature in a **** engine room. Moreover, the part which began to be prolonged in the low-temperature section outside an engine room is drawn, and it connects with the metal section of the car body which is not illustrated, and can be made to carry out thermal conduction of the attachment section 3a which attaches a radiation fin or is connected to the low-temperature section of the car body by the side of the end of the radiator material 3. If the end of the radiator material 3 is connected to the low-temperature section of a car body, further, heat dissipation can become good, can cool the body section 2, and can suppress the rise of dc-battery solution temperature.

[0010] As shown in drawing 3 as box-frame construction of the body section 2, the laminating of the metal membrane 8 may be carried out also to the field located in the inside by the side of a dc-battery 10, and you may make it the structure whose heat insulation resin layer 7 was pinched. Moreover, the laminating of the metal membrane 8 is carried out also inside the heat insulation resin layer 7, it considers as a metal membrane 6 and the structure whose heat insulation resin layer 7 was pinched among eight, and you may make it attach the radiator material 3 in the metal membrane 8 of the external surface by the side of a dc-battery 10, as shown in drawing 4. Thus, when the metal membrane 8 was formed also inside, it should excel in corrosion resistance, thermal resistance, etc.

[0011] Drawing 5 and drawing 6 are drawings showing the 2nd example of this invention. The thermal insulation equipment 11 of this example is equipped with the box-like body section 12 and the box-like radiator material 3, and is constituted. The body section 12 consists of a side attachment wall 13 and a bottom 14, and it is constituted so that the side face and pars basilaris ossis occipitalis of a dc-battery 10 may be enclosed. As shown in drawing 6, the side attachment wall 13 of this body section 12 and the structure of a bottom 14 arrange a metal membrane 6 on the outside of a side attachment wall 13 and a bottom 14, adjoin a metal membrane 6, and are carrying out the laminating of the heat insulation resin layer 7 to the inside side. 15 is the case of a dc-battery 10 and 16 is dc-battery liquid. In addition, as shown in drawing 3 and drawing 4, the heat insulation resin layer 7 of box-frame construction of this thermal insulation equipment 11 may be pinched, it may carry out the laminating of the metal membrane 6 outside, may carry out the laminating of the metal membrane 8 to inside external surface, and may form the radiator material 3 in the inside metal membrane 8.

[0012] It set up and the thermal insulation effectiveness of the thermal insulation equipment by this invention was examined, as shown in drawing 9. A 150-micrometer aluminum film is used for the thermal insulation equipment of the 1st example of this invention as internal and external metal membranes 6 and 8. Polyethylene foam with a thickness of 10mm is used as a heat insulation resin layer 7. As radiator material 3 2mm in thickness Since it said that the inside of an engine room went up at about 80 degrees C idling hours [4 hours] after an engine using the heat dissipation rubber which consists of special silicone rubber excellent in thermal conductivity with a width of face [of 100mm], and a die length of 400mm, it was set as 80 degrees C of ambient temperature, and aging of dc-battery solution temperature was measured. The result was shown in drawing 7. As a conventional example 1, using the aluminum film whose metal membrane 6 is 150 micrometers, using polyethylene foam with a thickness of 10mm as a heat insulation resin layer 7, it formed in the above and the isomorphism which do not attach the radiator material 3, and the result of having measured aging of 80 degrees C [of ambient temperature] dc-battery solution temperature was doubled, and was shown in drawing 7 for the comparison. According to drawing 7 which showed the measurement result of aging of the temperature of this dc-battery liquid, in the case of the example 1 of this invention, the temperature of dc-battery liquid can carry out to be about 2.5 hours in the conventional example about the time amount which goes up at 50 degrees C in 3.5 hours, and can delay for about 1 hour as compared with the conventional example. In the formal thermal insulation equipment 11 and the formal conventional example 2 of the 2nd example of this invention as shown in drawing 5, it was made the same layer structure as the 1st example of the above, and the result of having measured aging of dc-battery solution temperature was shown in drawing 8. According to the result, the temperature of dc-battery liquid can carry out to be about 4 hours in the conventional example about the time amount which goes up at 50 degrees C in about 5.5 hours, and it can delay for about 1.5 hours as compared with the conventional example. Thus, if it is made a case form and a dc-battery is surrounded like this example, a rise of dc-battery liquid can be suppressed well.

[0013] In addition, although the example without a upside lid explained the thermal insulation equipment for dc-battery protection in

the above-mentioned explanation, there may be a lid. The thermal insulation equipment of the invention is not restricted to the above-mentioned example, in short, it arranges a metal membrane on the outside by the side of an engine at least, adjoins a metal membrane, carries out the laminating of the heat insulation resin layer 7 to an inside side, and should just attach radiator material in a metal membrane.

[0014]

[Effect of the Invention] According to the thermal insulation equipment for dc-battery protection applied to this invention as mentioned above, heat insulation, a thermal reflex, and the heat dissipation effectiveness are size, and a dc-battery cannot be easily influenced of engine heat. Therefore, there are few solution temperature rises and ordinary temperature is held comparatively. Therefore, there is little evaporation (****) of a sealing liquid, while a dc-battery is maintenance-free-ized, there are few heat shocks inside a dc-battery (thermo cycle), and its endurance improves. Moreover, since the dc-battery is protected with the heat insulator, there are few solution temperature falls and they are excellent in heat retaining property in a cold district.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] About the thermal insulation equipment which protects the dc-battery of an automobile from the environmental temperature in an engine room, especially, this invention uses reflection, thermal insulation, and thermal conduction cooling, and relates to the thermal insulation equipment for dc-battery protection which prevents overheating of a dc-battery.

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PRIOR ART

[Description of the Prior Art] In recent years, engine piston outer wall temperature is high with 250 to 300 degrees C with the high increase in power of the engine for automobiles, turbo-izing, and small and lightweight-izing. [conventional] And with high *** in an engine room, and the formation of a small tooth space, the space in an engine room becomes narrow and the environmental temperature in an engine room also has the inclination of elevated-temperature-izing by leaps and bounds. A dc-battery is also put on the bottom of a hot environment under such conditions, and it has become the cause of faults, such as evaporation of dc-battery liquid, and a life fall. Although the dc-battery was conventionally loaded as it was in the automobile engine room, the approach of holding and insulating in the case which covers a dc-battery by heat insulation members, such as resin and heat insulation form, or the member of a laminated structure, or consists of these members (referring to the official report for JP.63-82454,A, JP.3-92377,U, etc.), or insulating by installing a dc-battery out of an engine room etc. is performed so that the above-mentioned fault may be prevented.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to the thermal insulation equipment for dc-battery protection applied to this invention as mentioned above, heat insulation, a thermal reflex, and the heat dissipation effectiveness are size, and a dc-battery cannot be easily influenced of engine heat. Therefore, there are few solution temperature rises and ordinary temperature is held comparatively. Therefore, there is little evaporation (****) of a sealing liquid, while a dc-battery is maintenance-free-ized, there are few heat shocks inside a dc-battery (thermo cycle), and its endurance improves. Moreover, since the dc-battery is protected with the heat insulator, there are few solution temperature falls and they are excellent in heat retaining property in a cold district.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, although dc-battery liquid will go up at 70 degrees C in 3 - 4 hours if a dc-battery is loaded as it is in a 80-degree C automobile engine room, with the thermal insulation equipment of the above-mentioned conventional dc-battery using heat insulation form etc., the time amount which goes up dc-battery solution temperature at 50-60 degrees C is delayable in 3 - 4 hours. However, although the time amount to which dc-battery solution temperature rises was delayable with conventional thermal insulation equipment, heat dissipation cooling was not able to be carried out from the environmental temperature of an engine room.

[0004] As this invention was made in view of the problem which the above-mentioned Prior art has, and it radiates heat while it intercepts the OAT to a dc-battery by reflection and heat insulation, it aims at offering the thermal insulation equipment for dc-battery protection which protects a dc-battery.

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MEANS

[Means for Solving the Problem] In the thermal insulation equipment for dc-battery protection with which it comes to carry out the laminating of the resin and the metal membrane for arranging in the external surface of a dc-battery case, this invention carries out the laminating of at least one metal membrane outside, and is characterized by equipping this metal membrane with the body section which carried out the laminating of the heat insulation resin layer, and was formed, and the radiator material attached and drawn at the metal membrane. In addition, the above-mentioned body section is formed in box-like from a side attachment wall and a bottom, and if the attachment section linked to the low-temperature section of a car body is prepared and this is connected to the end side of radiator material, conduction heat dissipation will become good further.

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OPERATION

[Function] According to the thermal insulation equipment for dc-battery protection concerning this invention, as mentioned above, on the external surface of a dc-battery case, arrange at least one metal membrane to an external surface side, and carry out the laminating of the heat insulation resin layer to this metal membrane. Since it constitutes from the formed body section and radiator material which the metal membrane was made to extend and was attached and this thermal insulation equipment is arranged in the external surface of a dc-battery case, the hot heat of an engine room is reflected by the metal membrane, and it insulates with a heat insulation resin layer, and emits via radiator material. Thus, a dc-battery is intercepted from the elevated temperature of an engine room by reflection and heat insulation, by heat dissipation, temperature can be lowered and dc-battery solution temperature can be maintained below to the environmental temperature of an engine room. Moreover, for the surface of metal of thermal insulation equipment, inflammability-proof and fire retardancy can improve and safety can be raised. If the configuration of the body section of the thermal insulation equipment of this invention is the type which covers the side face which the bottom opened, it can be easily attached in an existing dc-battery, and since the outcrop of a dc-battery will be made few if it is box-like [with a bottom] from a side attachment wall and a bottom, the effectiveness of thermal insulation becomes good so much. Even if it is the case where it leaves for a long time, since the member of a car body and the temperature gradient of an engine room are small, they can prevent cooling like conventional thermal insulation equipment, without moving an engine.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained based on a drawing. Drawing 1 thru/ or drawing 4 are drawings showing the 1st example of this invention. In these drawings, 1 is thermal insulation equipment of this example, is equipped with the body section 2 and the radiator material 3, and is constituted. The body section 2 consists of the wall 4 and the side-face wall 5 by the side of an engine 9, and it is made to have the side face of the methods of three of a dc-battery 10 enclosed. As shown in drawing 2, at least one metal membrane (metal film) 6 of the walls 4 and 5 of the body section 2 is arranged to the outside engine 9 side, a metal membrane 6 is adjoined, and the laminating of the heat insulation resin layer 7 is carried out. The radiator material 3 is attached in the metal membrane 6 of the wall 4 by the side of an engine.

[0008] Although the side-face wall 5 of the above-mentioned body section 2 is formed in the both sides of a wall 4, what you may make it enclose all the side faces of a dc-battery 10, and enclosed only the side face of the method of two may be used. It really fabricates or pastes up, and this body section 2 is formed by a laminating etc., and is arranged by attaching in it by pasting a dc-battery 10 or using auxiliary metallic ornaments, an attachment member, etc. on the external surface of a dc-battery 10, or attaching in dc-battery fixing metal etc. Although the film formed by films, such as stainless steel, aluminum, and copper, the plate, plating, or vacuum evaporation is mentioned as an example of a metal membrane 6, the thickness influences the weight and the conduction heating value of equipment, and especially limitation is not carried out, it is good at 50-200 micrometers. Since a thermal reflex will be improved if glossiness is high, it is effective. Moreover, if an ingredient with high thermal conductivity is used, heat conduction to the radiator material 3 will become good so much, and heat dissipation will become good. Foaming resin, such as resin, such as polypropylene, polyester, and an acrylic, or urethane foam, and polyethylene foam, is used for the heat insulation resin layer 7 which carries out a laminating to a metal membrane 6. Lightweight-ization is attained and this thickness is set to 5mm - 30mm, and expansion ratio is made into five to 30 times, and it is made not to make it not much thick by using foaming resin. Moreover, the combination of resin, the combination of a heat insulator and resin, and fiber etc. may be formed from two or more layers.

[0009] When the sheet of a metal and heat dissipation nature rubber etc. is used as a member with a flexible thin film as radiator material 3, it excels in the attachment nature in a **** engine room. Moreover, the part which began to be prolonged in the low-temperature section outside an engine room is drawn, and it connects with the metal section of the car body which is not illustrated, and can be made to carry out thermal conduction of the attachment section 3a which attaches a radiation fin or is connected to the low-temperature section of the car body by the side of the end of the radiator material 3. If the end of the radiator material 3 is connected to the low-temperature section of a car body, further, heat dissipation can become good, can cool the body section 2, and can suppress the rise of dc-battery solution temperature.

[0010] As shown in drawing 3 as box-frame construction of the body section 2, the laminating of the metal membrane 8 may be carried out also to the field located in the inside by the side of a dc-battery 10, and you may make it the structure whose heat insulation resin layer 7 was pinched. Moreover, the laminating of the metal membrane 8 is carried out also inside the heat insulation resin layer 7, it considers as a metal membrane 6 and the structure whose heat insulation resin layer 7 was pinched among eight, and you may make it attach the radiator material 3 in the metal membrane 8 of the external surface by the side of a dc-battery 10, as shown in drawing 4. Thus, when the metal membrane 8 was formed also inside, it should excel in corrosion resistance, thermal resistance, etc.

[0011] Drawing 5 and drawing 6 are drawings showing the 2nd example of this invention. The thermal insulation equipment 11 of this example is equipped with the box-like body section 12 and the box-like radiator material 3, and is constituted. The body section 12 consists of a side attachment wall 13 and a bottom 14, and it is constituted so that the side face and pars basilaris ossis occipitalis of a dc-battery 10 may be enclosed. As shown in drawing 6, the side attachment wall 13 of this body section 12 and the structure of a bottom 14 arrange a metal membrane 6 on the outside of a side attachment wall 13 and a bottom 14, adjoin a metal membrane 6, and are carrying out the laminating of the heat insulation resin layer 7 to the inside side. 15 is the case of a dc-battery 10 and 16 is dc-battery liquid. In addition, as shown in drawing 3 and drawing 4, the heat insulation resin layer 7 of box-frame construction of this thermal insulation equipment 11 may be pinched, it may carry out the laminating of the metal membrane 6 outside, may carry out the laminating of the metal membrane 8 to inside external surface, and may form the radiator material 3 in the inside metal membrane 8.

[0012] It set up and the thermal insulation effectiveness of the thermal insulation equipment by this invention was examined, as shown in drawing 9. A 150-micrometer aluminum film is used for the thermal insulation equipment of the 1st example of this invention as internal and external metal membranes 6 and 8. Polyethylene foam with a thickness of 10mm is used as a heat insulation resin layer 7. As radiator material 3 2mm in thickness Since it said that the inside of an engine room went up at about 80 degrees C idling hours [4 hours] after an engine using the heat dissipation rubber which consists of special silicone rubber excellent in thermal conductivity with a width of face [of 100mm], and a die length of 400mm, it was set as 80 degrees C of ambient temperature, and aging of dc-battery solution temperature was measured. The result was shown in drawing 7. As a

conventional example 1, using the aluminum whose metal membrane 6 is 150 micrometers, using polyethylene foam with a thickness of 10mm as a heat insulation resin layer 7, it formed in the above and the isomorphism which do not attach the radiator material 3, and the result of having measured aging of 80 degrees C [of ambient temperature] dc-battery solution temperature was doubled, and was shown in drawing 7 for the comparison. According to drawing 7 which showed the measurement result of aging of the temperature of this dc-battery liquid, in the case of the example 1 of this invention, the temperature of dc-battery liquid can carry out to be about 2.5 hours in the conventional example about the time amount which goes up at 50 degrees C in 3.5 hours, and can delay for about 1 hour as compared with the conventional example. In the formal thermal insulation equipment 11 and the formal conventional example 2 of the 2nd example of this invention as shown in drawing 5, it was made the same layer structure as the 1st example of the above, and the result of having measured aging of dc-battery solution temperature was shown in drawing 8. According to the result, the temperature of dc-battery liquid can carry out to be about 4 hours in the conventional example about the time amount which goes up at 50 degrees C in about 5.5 hours, and it can delay for about 1.5 hours as compared with the conventional example. Thus, if it is made a case form and a dc-battery is surrounded like this example, a rise of dc-battery liquid can be suppressed well.

[0013] In addition, although the example without a upside lid explained the thermal insulation equipment for dc-battery protection in the above-mentioned explanation, there may be a lid. The thermal insulation equipment of this invention is not restricted to the above-mentioned example, in short, it arranges a metal membrane on the outside by the side of an engine at least, adjoins a metal membrane, carries out the laminating of the heat insulation resin layer 7 to an inside side, and should just attach radiator material in a metal membrane.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the 1st example of the thermal insulation equipment for dc-battery protection by this invention.

[Drawing 2] It is the expanded sectional view which meets the A-A line of drawing 1 .

[Drawing 3] It is the expanded sectional view showing other examples which meet the A-A line of drawing 1 .

[Drawing 4] It is the expanded sectional view showing other examples in the pan which meets the A-A line of drawing 1 .

[Drawing 5] It is the perspective view of the 2nd example of the thermal insulation equipment for dc-battery protection by this invention.

[Drawing 6] It is the expanded sectional view which meets the A-A line of drawing 5 .

[Drawing 7] It is the graph which shows the comparison with the conventional example of aging of the dc-battery solution temperature rise by the 1st example of this invention.

[Drawing 8] It is the graph which shows the comparison with the conventional example of aging of the dc-battery solution temperature rise by the 2nd example of this invention.

[Drawing 9] It is drawing explaining the experiment approach of the temperature reduction of the thermal insulation equipment for dc-battery protection.

[Brief Description of Notations] 1 11 Thermal insulation equipment for dc-battery protection

2 12 Body section

3 Radiator Material

3a Attachment section

6 Eight Metal membrane (metal film)

7 Heat Insulation Resin Layer

[Translation done.]

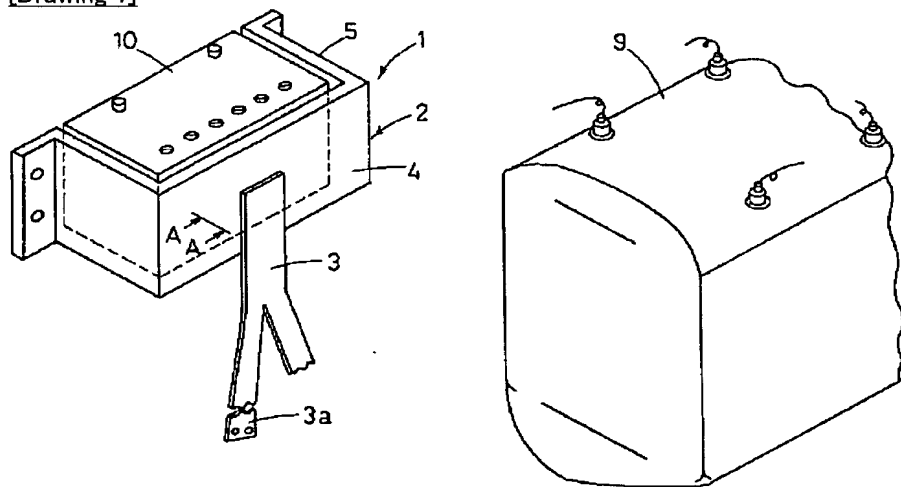
* NOTICES *

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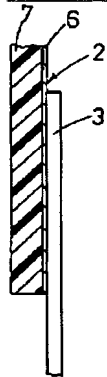
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DRAWINGS

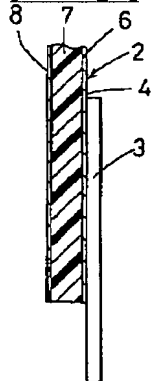
[Drawing 1]



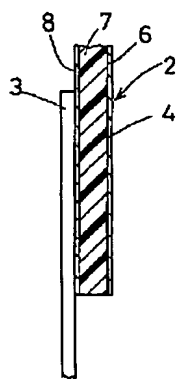
[Drawing 2]



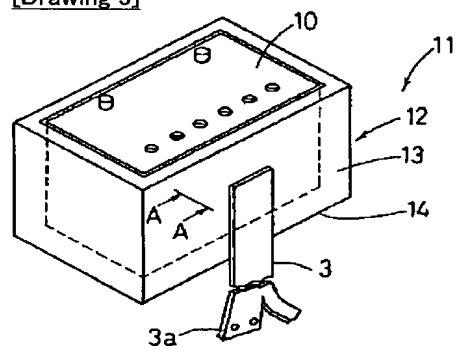
[Drawing 3]



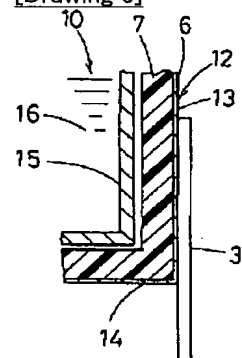
[Drawing 4]



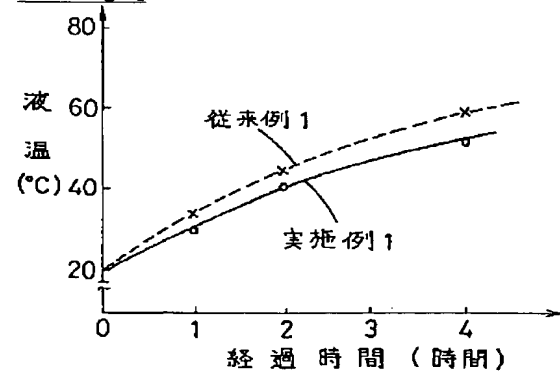
[Drawing 5]



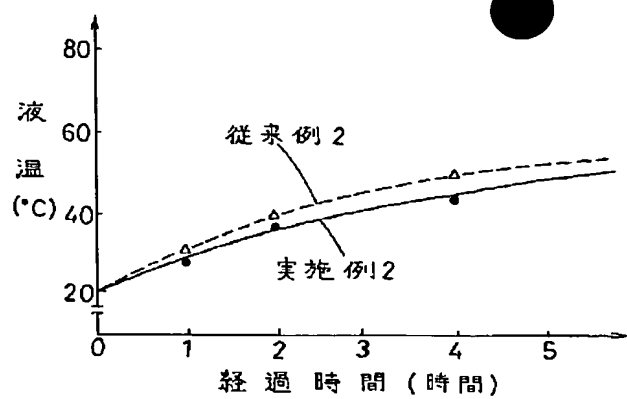
[Drawing 6]



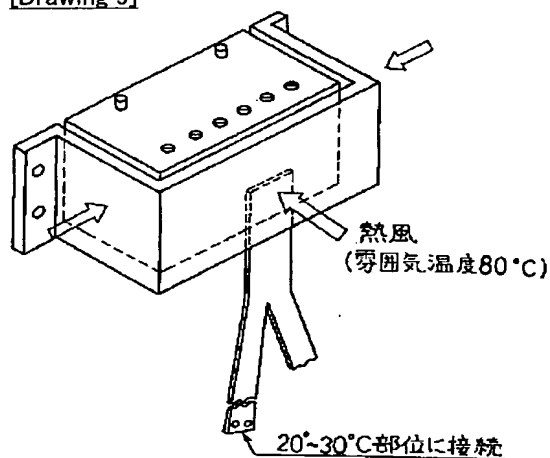
[Drawing 7]



[Drawing 8]



[Drawing 9]



[Translation done.]